Difficult Airway Society 2015 Guidelines

An overview for FCA Part 2 Candidate

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Introduction

The original Difficult Airway Society (DAS, <u>www.das.uk.org</u>) Guidelines for Unanticipated Difficult Intubation were published in 2004.¹ Widely accepted and referenced, these guidelines were a success for the society, and undoubtedly improved patient safety, but had become quite out of date. However, it was decided to wait for the completion of the United Kingdom's Fourth National Audit Project (NAP4)^{2 3} in 2011 before beginning to update the intubation guidelines, in order to incorporate these findings. Over 23 000 abstracts and nearly a thousand full text articles were reviewed in the process. The new DAS intubation guidelines were officially published and simultaneously presented at the 1st World Airway Management Meeting (WAMM) in Dublin, Ireland, in November 2015.^{4 5} It is important to note that while these guidelines (like their 2004 predecessors) are evidenced-based, they are comprised of consensus expert opinion. Input from the DAS membership was included at the annual scientific meeting in November 2014, and online from members worldwide (including South Africa).

Available guidelines

DAS has produced a series of guidelines, which are updated at irregular intervals by the appropriate working groups. These include the general difficult airway guidelines⁴ (2015), obstetric⁶ (2015, in conjunction with the OAA), paediatric⁷ (in conjunction with the APA) extubation⁸ (2013), and fibreoptic intubation via supraglottic airway guidelines. These are reproduced at the end of these notes for your reference and convenience, but only the latest intubation guidelines are discussed.⁵

DAS have continued the theme of having a 'Plan A/B/C/D' approach to unexpected difficulty. This ensures that the practitioner does not become fixated on one technique (for instance, intubation) and allow the patient to become dangerously hypoxic when changing approach (for instance, mask ventilation or placement of a supraglottic airway device (SAD/SGA)) would allow oxygenation. Implicit in this strategy, however, is the presumption that patients are carefully assessed preoperatively, and an alternative airway approach (for instance, awake fibreoptic intubation) is performed if the standard approaches are not feasible. Thus, these guidelines should not be relied upon in *anticipated* problems, but rather for *unanticipated difficulty*.

All DAS current guidelines are freely available for download from the DAS website at <u>www.das.uk.com/guidelines</u>. A larger collection of algorithms including guidelines from other organisations and societies (ASA, Vortex, Canadian, SA Resuscitation Council, etc.) can be found at <u>www.openairway.org/algorithms/</u>.

It should be noted that algorithms along *do not* constitute the full extent of the guidelines. Reading or using the algorithms alone, without the accompanying article,⁵ will inadequately prepare the practitioner to make evidenced-based decisions at a specialist level. These notes highlight the most salient points, new changes, and some controversies.



DAS Difficult intubation guidelines - overview

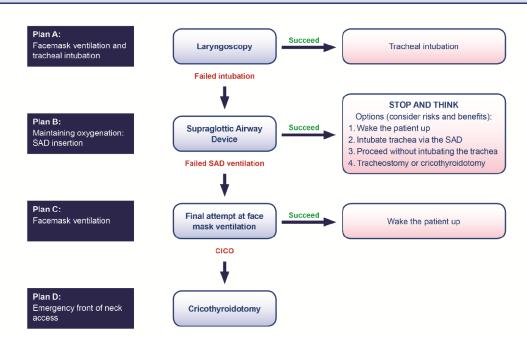
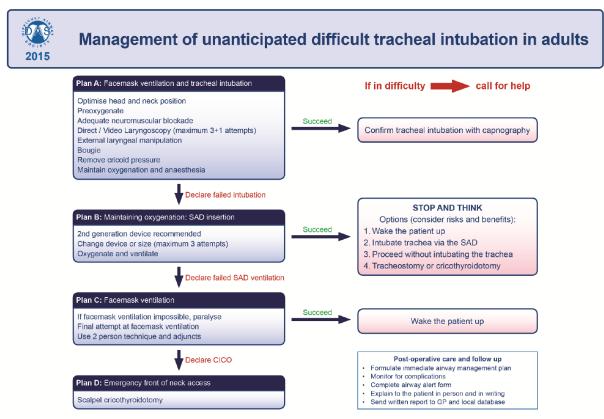


Figure 1. DAS 2015 Difficult intubation guidelines - overview. See note under references for usage permissions.



This flowchart forms part of the DAS Guidelines for unanticipated difficult intubation in adults 2015 and should be used in conjunction with the text.

Figure 2. DAS 2015 guideline on 'Management of unanticipated difficult tracheal intubation in adults.'



Failed intubation, failed oxygenation in the paralysed, anaesthetised patient

CALL FOR HELP

Continue 100% O₂ Declare CICO

Plan D: Emergency front of neck access

Continue to give oxygen via upper airway Ensure neuromuscular blockade Position patient to extend neck

Scalpel cricothyroidotomy Equipment: 1. Scalpel (number 10 blade) 2. Bougie 3. Tube (cuffed 6.0mm ID) Laryngeal handshake to identify cricothyroid membrane Palpable cricothyroid membrane Transverse stab incision through cricothyroid membrane Turn blade through 90° (sharp edge caudally) Slide coude tip of bougie along blade into trachea Railroad lubricated 6.0mm cuffed tracheal tube into trachea Ventilate, inflate cuff and confirm position with capnography Secure tube Impalpable cricothyroid membrane Make an 8-10cm vertical skin incision, caudad to cephalad Use blunt dissection with fingers of both hands to separate tissues Identify and stabilise the larynx Proceed with technique for palpable cricothyroid membrane as above

Post-operative care and follow up

- Postpone surgery unless immediately life threatening
- Urgent surgical review of cricothyroidotomy site
- Document and follow up as in main flow chart

Figure 3. DAS 2015 guideline for emergency front-of-neck surgical airway access in the failed intubation, failed oxygenation situation in the anaesthetized patient.

Significant changes in the 2015 guidelines

Simplification of the difficult intubation guidelines

Previously, the DAS guidelines were different for situations of unexpected difficulty in elective (routine induction) compared to emergency (rapid sequence induction) patients. It was recognised that this created unnecessary complication and reduced performance in critical situations. Furthermore, fear of aspiration is believed to cause practitioners to delay in taking essential steps to ensure oxygenation in patients where difficulty was encountered in RSI. The new algorithms do not distinguish between these situations, and stress ensuring oxygenation over other concerns in an emergency.⁵

The observer will note that two versions of the 2015 algorithm have been created. A simplified 'Overview' algorithm states only the critical steps, and is intended to be rapidly accessible in an emergency situation. A more detailed version has the identical layout and steps, but includes prompts for optimisation of each step. This is ideal for study purposes, or even to serve as a checklist for a second practitioner in an emergency.

Facemask ventilation and intubation

Emphasis in the new guidelines is placed upon optimizing the conditions for facemask ventilation and subsequent intubation as the routine 'Plan A' in daily airway management. This includes making and stating a plan for failure, adequate pre-oxygenation, and good positioning. The value of ramping the patient to achieve the optimal 'sniffing' position is well recognized. Stress is placed on obtaining a position where the external auditory meatus and sternal notch are in the same horizontal plane with the patient's face is parallel to the ceiling – the so-called 'ear-to-sternal-notch' (E2SN) position – which straightens the curvatures of the airway and provides an visual axis for intubation.^{9 10}

The 2015 guidelines include the concept of early use of videolaryngoscopy (VL), either as a standard approach, or when difficulty is encountered. This is based on increasing evidence that VL improves glottis view in difficult airways, and increases intubation success rates in appropriately skilled hands. It should be noted, however, that this presumes the practitioner is well trained with the device in question. All anaesthetists should make efforts to ensure they are skilled with VL. Furthermore, a shaped stlyet or bogie should always be used conjunction with VL.

It is well established that neuromuscular blockade (NMB) improved intubation conditions, and does not cause deterioration in ability to provide facemask ventilation. The guidelines stress considering administration of further paralytics when in difficulty, and advocate for the use of NMB monitoring, especially when airway management attempts are prolonged.

Maintenance of oxygenation

The guidelines emphasize the early recognition of difficulty or failure to intubate, and encourage that the situation is immediately declared. Rapid placement of an SAD in this situation (even when facemask ventilation is possible) affords the anaesthetist the opportunity to remain calm and consider options carefully. For the first time, the guidelines suggest using a 2nd generation SAD in all such situations. (See discussion of this below). However, failure to obtain adequate oxygenation within two attempts with an SAD (allowing a third attempt with a second type/size of SAD after the first two failures) should prompt immediate progression to front-of-neck access. It is important to note that repetitive insertion attempts cause worsening airway trauma, and more than 3 attempts seldom results in an improved success rate. Bougie-guided insertion of Proseal LMA (Brimacombe maneuver) has been shown to improve first-insertion success and should be considered if the anaesthetist is practiced in this technique.

"Stop and Think"

If the placement of an SAD is successful in establishing oxygenation and ventilation, the practitioner is prompted to consider four options: waking the patient up with the SAD in place; performing a fibreoptic-guided intubation through the SAD; proceeding without intubation; or performing a formal tracheostomy or cricothyroidotomy. In settings with access to a flexible endoscope, blind intubation through the SAD is considered redundant.

Inclusion of this phase is aimed at eliminating the fixation on need to intubate the patient, and giving the practitioner a chance to carefully consider the options. This emphasis on avoiding 'human factors' errors in airway management is a strong theme in the new guidelines, as these errors were implicated in 40% of cases of harm in NAP4.³ Further work into the use of cognitive aids for crises in airway management is ongoing.

Front-of-neck access

Previously known as 'surgical airway' techniques, the terminology 'front-of-neck access' has become more popular to help emphasise that this is a set of approaches which are not limited to surgeons. All airway practitioners (especially anaesthetists) should be experts in obtaining a surgical airway, even if the skill is never required in anger.

Predominantly on the basis of the findings of NAP4, the guidelines have now been simplified to remove needle/cannula cricothyroidotomy and proceed directly to a surgical cricothyroidotomy (or circothyrotomy, if you prefer the American nomenclature). The reasons behind this are two-fold: Firstly, needle 'cric' was associated with a very poor success rate in NAP4. Secondly, recent work has shown that practitioners in an emergency crisis often vacillate between needle and scalpel when offered the choice. By simplifying the algorithm and providing one didactic technique, the cognitive loading and delay is diminished. However, the guidelines do suggest that anaesthetists receive frequent training and simulation on CICO situations.

The 2015 guidelines clearly describe the advised technique for cricothyroidotomy. The required equipment is a scalpel with number 10 blade, a coudé-tipped introducer/bougie, and a 6.0 cuffed endotracheal tube. The non-dominant hand is used to perform a 'laryngeal handshake' (gripping and moving the larynx from side to side to clearly identify its position). The index finger is then moved in the midline to palpate the thyroid and cricoid cartilages, and the cricothyroid membrane between them. If these can be palpated, a single horizontal stab incision is made, the blade rotated into a vertical orientation, and pulled sideways to allow insertion of a bougie (preferably a Frova introducer, to allow immediate oxygen insufflation). If the cartilaginous structures are impalpable, an 8-10 cm vertical incision is made in the midline of the neck, followed by blunt dissection with the fingers until the cartilages are palpable, and then a stab incision and insertion of bougie, as above. Finally, a 6.0 cuffed ETT is inserted to allow ventilation.

Debates & controversies

The use of cricoid pressure during rapid sequence intubation remains extremely controversial, with vociferously divided opinions in the literature and online media. While it is not discussed further here, anaesthetists should have an understanding of the evidence for, and criticisms against, its use. In recognition that *injudiciously* applied cricoid pressure (CP) can worsen laryngoscopic view, a gradual release of CP during difficult intubation, and complete release during insertion of a supraglottic airway, is advocated in the new guidelines. It is important to realize that by the time a rescue SGA is required, ensuring oxygenation takes precedence over prevention of aspiration, and maintaining CP while inserting an SGA can hinder the distal tip of the SGA from becoming adequately

seated in the cricopharygeus muscle ring. This will prevent adequate sealing, may worsen risk of aspiration, and in the worst-case scenario can cause the tip of the device to enter the trachea, causing complete airway obstruction (this is infrequently seen with devices such as the laryngeal tube airway).

The routine use of 2nd generation supraglottic airways has been promoted by these guidelines, and echoed in the literature. Largely, this is based on numerous studies which show improved protection against aspiration in various non-emergency models.¹¹⁻¹⁵ While outcomes data is very limited, it is worth noting that in the NAP4 study, only one case of aspiration with an SAD occurred with a 2nd generation device, although absolute numbers were not sufficient to draw a strong conclusion. While it makes inherent sense to use devices offering aspiration protection, it must be remembered that the most critical function of placing an SAD in a failed intubation is to provide oxygenation. Some of these devices require more operator skill, most are more costly than the 1st generation equivalent, and they may not be immediately at hand.

Videolaryngoscopy has undoubtedly had an enormous influence on the practice of difficult airway management over the last decade, but is not a panacea. Importantly, while VL often facilitates an improved view of the larynx, it can still be exceptionally difficult to insert the ETT. Anaesthetists must understand the limitations of VL, and the appropriate techniques and introducers/bougies/stylets to sue with each type of blade. Finally, in our context, VL remains unavailable in a great many settings. Making certain we maintain excellent direct laryngoscopy (DL) skills is therefore essential.

The removal of cannula cricothyroidotomy from the guidelines has been met with significant resistance. Anaesthetists, as a group, are generally more comfortable with percutaneous techniques which involve a needle rather than a blade. Other detractors argue that equipment for surgical cric is not always immediately at hand, whereas a large bore IV cannula is always close by. Furthermore, the argument that success rates of surgical cric in NAP4 were much better than needle cric is tainted by the fact that all surgical cricothyroidotomies in the audit were performed by surgeons who were present in theatre or arrived on scene. Work from Australia has shown that cannula cricothyroidotomy and oxygen insufflation can be readily and reliably achieved in an animal simulation model by practitioners who are well (and frequently) trained in the technique (*Dr Andy Heard, pending publication*). However, this in itself is not necessarily an achievable outcome in many settings.

The technique of surgical airway access is also hotly debated. The DAS guidelines advise a standardized "scalpel-bougie-tube" technique, where other experts promote scalpel-finger-bougie, needle-guidewire-dilator-tube, scalpel-hook-tube, scalpel-hemostat-tube, etc. While we are unlikely to see RCTs of these techniques in clinical practice, numerous studies on laboratory and animal models are underway. Most importantly, the savvy anaesthetist should know the potential pitfalls of any technique, and be confident and practiced in performing the one method they have selected.

Additional Guidelines

Provided below for your reference. High-quality versions of all guidelines are available from the DAS web site and may be freely used for educational purposes with attribution. (See the comment under 'References' with regards to permissions for reproduction).

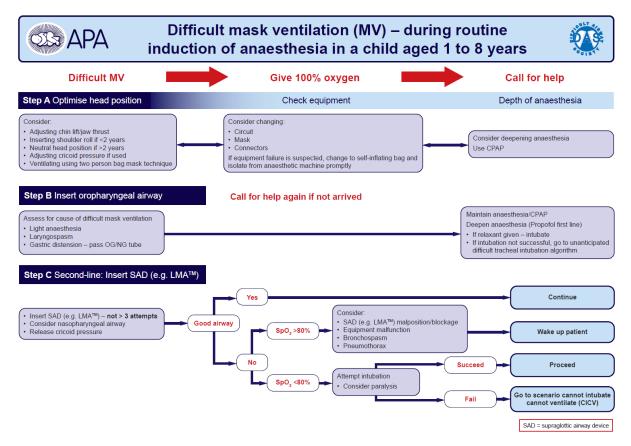


Figure 4. DAS/APA algorithm for difficult mask ventilation in children.

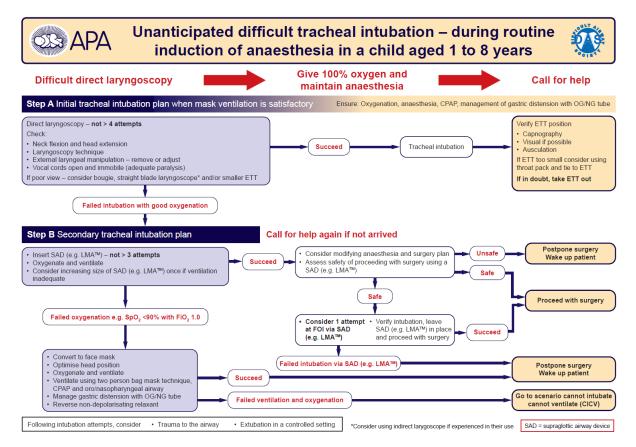


Figure 5. DAS/APA algorithm for unexpected difficult tracheal intubation in children.

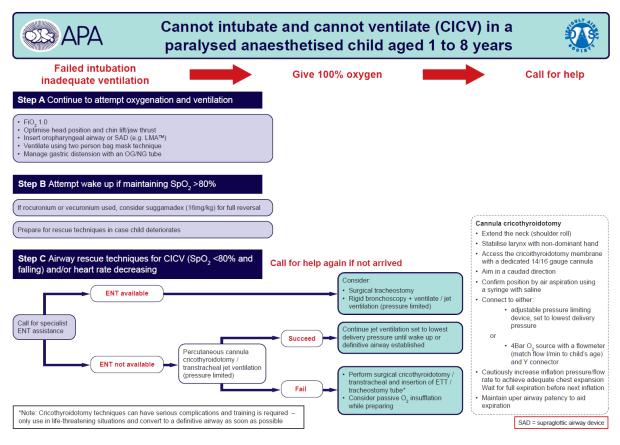


Figure 6. DAS/APA algorithm for CICO in children.

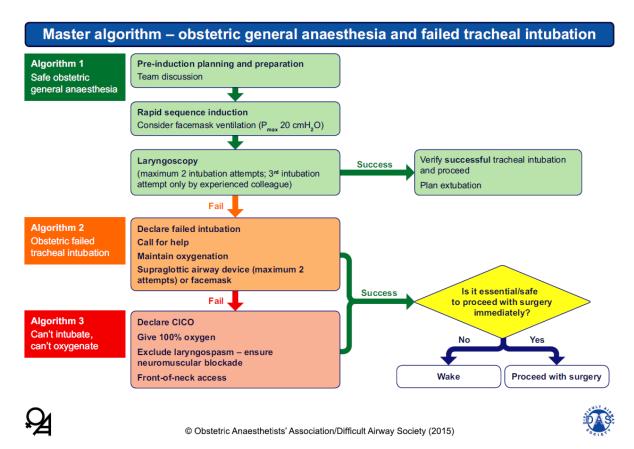


Figure 7. DAS/OAA master algorithm for failed intubation in obstetric general anaesthesia.

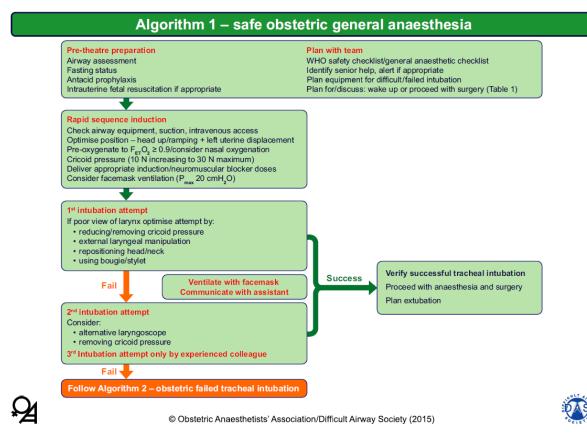


Figure 8. DAS/OAA Algorithm for safe obstetric GA.

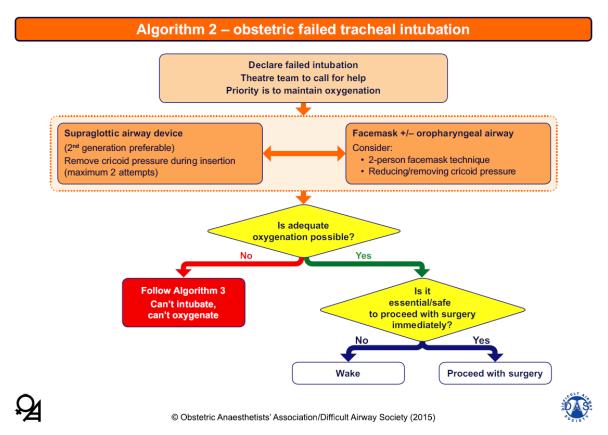


Figure 9. DAS/OAA algorithm for failed intubation in obstetric GA.

Algorithm 3 – can't intubate, can't oxygenate

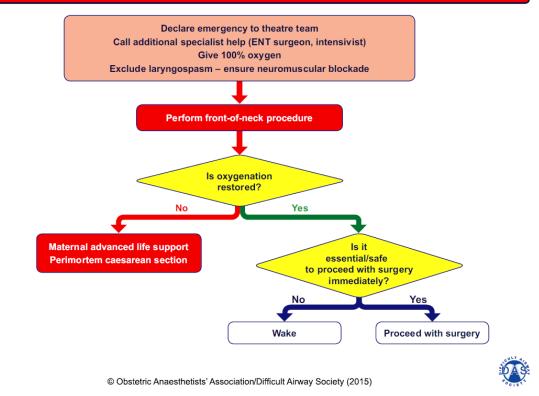


Figure 10. DAS/OAA algorithm for CICO in obstetric GA.

Factors to consider		WAKE	← →		PROCEED
Before induction	Maternal condition	No compromise	Mild acute compromise	Haemorrhage responsive to resuscitation	Hypovolaemia requiring corrective surgery Critical cardiac or respiratory compromise, cardiac arrest
	Fetal condition	No compromise	• Compromise corrected with intrauterine resuscitation, pH < 7.2 but > 7.15	Continuing fetal heart rate abnormality despite intrauterine resuscitation, pH < 7.15	Sustained bradycardia Fetal haemorrhage Suspected uterine rupture
	Anaesthetist	Novice	Junior trainee	Senior trainee	Consultant/specialist
	Obesity	Supermorbid	• Morbid	•Obese	Normal
	Surgical factors	 Complex surgery or major haemorrhage anticipated 	Multiple uterine scars Some surgical difficulties expected	Single uterine scar	No risk factors
	Aspiration risk	Recent food	 No recent food In labour Opioids given Antacids not given 	No recent food In labour Opioids not given Antacids given	 Fasted Not in labour Antacids given
	Alternative anaesthesia • regional • securing airway awake	No anticipated difficulty	Predicted difficulty	Relatively contraindicated	 Absolutely contraindicated or has failed Surgery started
After failed intubation	Airway device/ ventilation	 Difficult facemask ventilation Front-of-neck 	Adequate facemask ventilation	First generation supraglottic airway device	 Second generation supraglottic airway device
	Airway hazards	 Laryngeal oedema Stridor 	• Bleeding • Trauma	Secretions	None evident

Figure 11. DAS/OAA table of factors to consider after an airway emergency during caesarean section.

Table 2 – management after failed tracheal intubation

Wake

Maintain oxygenation

- Maintain cricoid pressure if not impeding ventilation
- Either maintain head-up position or turn left lateral recumbent
- · If rocuronium used, reverse with sugammadex
- Assess neuromuscular blockade and manage awareness
 if paralysis is prolonged
- · Anticipate laryngospasm/can't intubate, can't oxygenate

After waking

- · Review urgency of surgery with obstetric team
- · Intrauterine fetal resuscitation as appropriate
- · For repeat anaesthesia, manage with two anaesthetists
- Anaesthetic options:
- Regional anaesthesia preferably inserted in lateral position
- Secure airway awake before repeat general anaesthesia

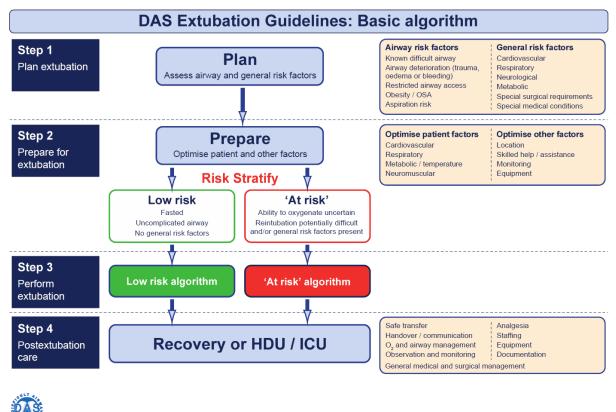
Proceed with surgery

- · Maintain anaesthesia
- · Maintain ventilation consider merits of:
 - controlled or spontaneous ventilation
 - paralysis with rocuronium if sugammadex available
- Anticipate laryngospasm/can't intubate, can't oxygenate
- · Minimise aspiration risk:
 - maintain cricoid pressure until delivery (if not impeding ventilation)
 - after delivery maintain vigilance and reapply cricoid pressure if signs of regurgitation
 - empty stomach with gastric drain tube if using second-generation supraglottic airway device
 - minimise fundal pressure
- administer H₂ receptor blocker i.v. if not already given
- · Senior obstetrician to operate
- Inform neonatal team about failed intubation
- Consider total intravenous anaesthesia



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Figure 12. DAS/OAA table for management of failed obstetric intubation.



Difficult Airway Society Extubation Algorithm 2011

Figure 13. DAS extubation guidelines - basic algorithm.

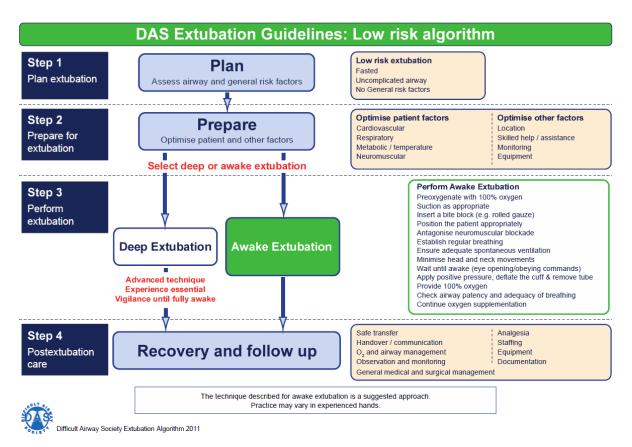
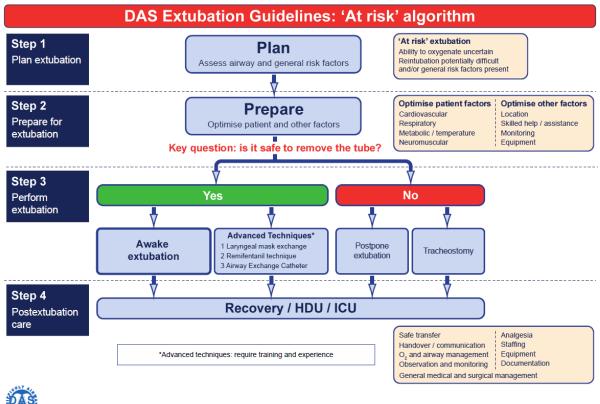


Figure 14. DAS low risk extubation algorithm.



Difficult Airway Society Extubation Algorithm 2011

Figure 15. DAS 'At Risk' extubation algorithm

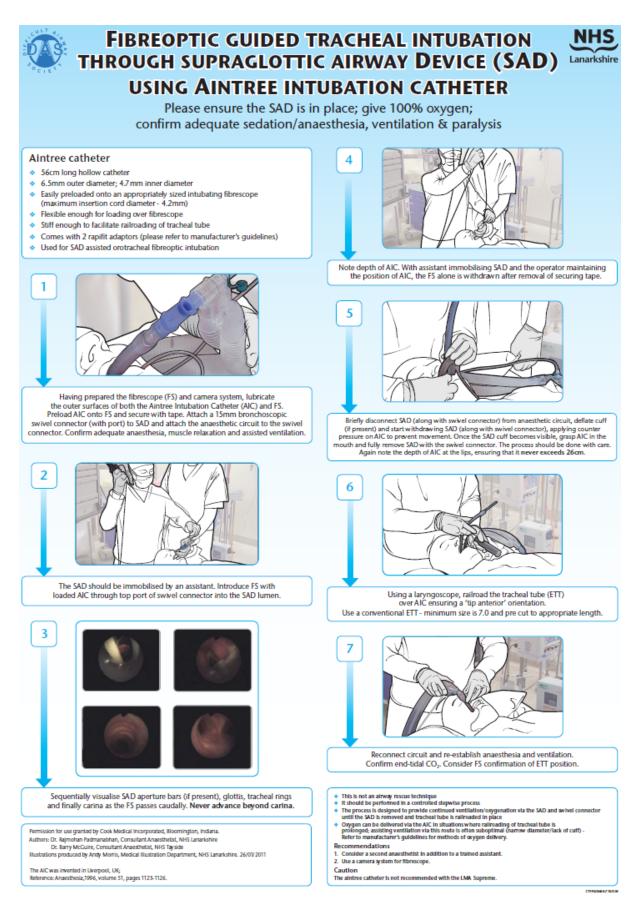


Figure 16. DAS guideline on fibreoptic guided tracheal intubation through a supraglottic airway device using the Aintree Intubation Catheter.

References

All current DAS guidelines can be downloaded freely from the DAS website,

<u>www.das.uk.com/guidelines</u>. A larger collection of algorithms including guidelines from other organisations and societies (ASA, Vortex, Canadian, SA Resuscitation Council, etc.) can be found at <u>www.openairway.org/algorithms/</u>.

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